B.E. (Computer Science Engineering) Fourth Semester (C.B.S.)

Data Structure & Program Design Paper - II

P. Pages : 3 **TKN/KS/16/7382**

Time : Three Hours * 0 7 7 5 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.

1. a) Give the snapshot of following elements using quick sort. Algo specify its time complexity in all cases. **8**

21 06 56 61 44 07 09 76 75 32

b) Write a 'C' program to sort the elements of matrix row-wise. Assume that the matrix is represented by two dimensional array. **6**

OR

2. a) Determine the frequency counts for all statements in the following program segments. **6**

i)
```
for ( i = 1 ; i  < = n ; i ++ )
    for ( j = 1 ; j < = i ; j ++)
        for (k = 1 ; k < = j ; k++)
            x = x + 1 ;
```

ii)
```
i = 1
while ( i < = n)
{
    x = x  + 1;
    i = i + 1;
}
```

b) Search the following elements using linear search as well as binary search. Give the step by step representation for successful as well as unsuccessful search. Algo specify time complexity of both **8**

80 75 45 90 30 40 12 15 93 08

3. a) Explain with example: **9**
- i) Circular linked list.
- ii) Doubly linked list
- iii) Generalized linked list

b) Write an algorithm to search an element in singly linked list. **5**

OR

4. a) Write a 'C' function to reverse the links of singly linked list. **5**

b) Write an algorithm for insertion in the doubly linked list. **9**
i) Insertion at beginning.
ii) Insertion at eng
iii) Insertion at specific location.

5. a) Convert the following expression into postfix using stack. **6**
i) $A * (B + C) - (G + H) / L + P$
ii) $x * (y + z) / A - B * (C + D / E)$
iii) $a + b * c + (d * e + f) * g$

b) In a circular queue represented by an array, how can one specify the number of elements in the queue in terms of front, rear and MaxQ? Write a 'C' function to delete the element from the circular queue. **7**

OR

6. a) Explain : **6**
i) Priority queue
ii) Double ended queue

b) Write 'C' function for push' POP operation in stack. Also explain the applications of a stack. **7**

7. a) Draw the binary search tree resulting from insertion of the integer keys: **6**
50 72 96 99 107 26 12 11 92 10
convert the tree to as inorder threaded binary tree.

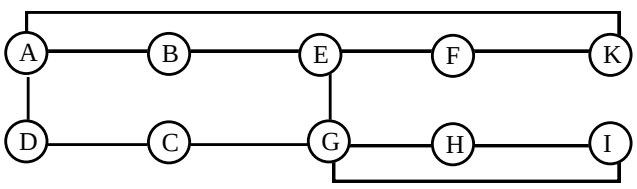
b) Write a 'C' function to determine the depth of the binary tree as well as to count the number of leaf nodes in the tree. **7**

OR

8. a) What is height balanced tree? Explain what you mean by balance factor. Construct a height balanced tree from the following sequence of integer. **8**
40 30 20 10 05 50 60 80 70

b) Construct the tree if preorder and inorder traversal of binary tree is given. **5**
Preorder : G B Q A C K F P D E R H
Inorder : Q B K C F A G P E D H R

9. a) Describe DFS algorithm. Find out the DFS traversal of the following graph starting at node A. **7**

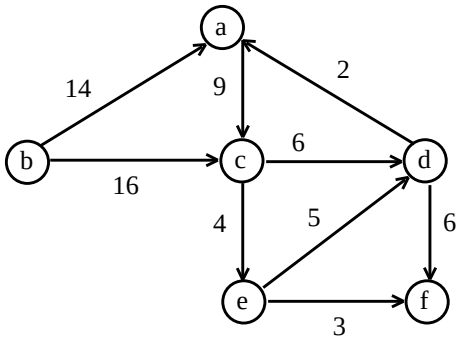


b) Write an Bellman ford Algorithm to find single source shortest path in a graph. **6**

OR

10. a) Explain with example. **9**
i) Hamiltonian cycle
ii) Topological sorting.
iii) Activity network

b) Find the minimum cost spanning tree using Kruskal's method for the following graph. **4**



11. Distinguish between **13**
i) Files and records.
ii) Sequential and Random access.
iii) Input, output and input / output files.
iv) Text and binary files.
v) Absolute addressing and relative address.

OR

12. a) Why B^+ tree is considered a better structure than B-tree for implementation of an indexed sequential. **6**

b) Explain collision resolution and hash function. **7**

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